



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/526,497

03/04/2005

Armin Kubelbeck

MERCK-2976

7347

23599

7590

07/09/2010

MILLEN, WHITE, ZELANO & BRANIGAN, P.C.  
2200 CLARENDON BLVD.  
SUITE 1400  
ARLINGTON, VA 22201

EXAMINER

EMPIE, NATHAN H

ART UNIT

PAPER NUMBER

1712

NOTIFICATION DATE

DELIVERY MODE

07/09/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@mwzb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/526,497	<b>Applicant(s)</b> KUBELBECK ET AL.	
	<b>Examiner</b> NATHAN H. EMPIE	<b>Art Unit</b> 1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2,4,6-8,10-12,14 and 16-28 is/are pending in the application.
- 4a) Of the above claim(s) 17 and 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2, 4, 6-8, 10-12, 14, 16, and 19-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

Applicant's submission filed on 5/4/10 has been entered. Claims 2, 4, 6-8, 10-12, 14, 16, and 19-28 are currently pending examination, claims 17 and 18 have been previously withdrawn.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki in view of Ichinose et al (US patent 5,688,366; hereafter Ichinose), Skorupski et al (US 2002/0162218; hereafter Skorupski) and Klein et al (machine translation of DE10101926; hereafter Klein)

Claim 14: Yamazaki teaches a method for etching of silicon surfaces and layers for isolation of the pn transition in solar cells comprising applying an etching medium to the surface of said silicon or a layer for isolation of the pn transition in a solar cell (texture, selective pattern, 106 to the uppermost portion of silicon substrate 105, Fig 2A, (col 11 lines 44-64); and it is preferable that a portion in the vicinity of the surface of the n-type conductive region 107 is etched and removed by sodium hydroxide (not shown), (col 12 lines 14 – 28).

Yamazaki does not teach a thickened etching medium. Ichinose teaches a chemical etching process with an alkali solution mixed with an additive to form a paste

Art Unit: 1712

(col 3 lines 35-52). The motivation to thicken the etching medium taught by Yamazaki is provided by Ichinose that teaches that etching with a paste “has excellent selectivity, and does little to no damage to the non-etching region” (col 1 lines 8-16), additionally, Ichinose teaches that applying the etchant as a paste is advantageous over conventional methods in that no pre-processes for forming a positive resist pattern, exposure, and development are required to apply an etched pattern to a surface; in addition, the post-process of resist removal is not needed (col 4 lines 7-30). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have thickened, as taught by Ichinose, the etching medium taught by Yamazaki to enable spatial etch selectivity that would eliminate processing steps.

Yamazaki further teaches forming a textured substrate surface, which is selectively exposed to the etchant to produce said structure (see, for example, col 11 lines 44-64). Yamazaki further teaches wherein the desired surface texture formed on the silicon substrate possess surface features on the order of 0.1 to 5 microns. Yamazaki has taught wherein the etching / texturing is intentional to control light scattering. Although Yamazaki has not explicitly taught wherein the etching is conducted to a depth of 1-3 microns, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated such a range of etching depth since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976) and further since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable

Art Unit: 1712

ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Yamazaki further teaches wherein the base constituent (see, for example NaOH) is in an amount of about 2% of the etching paste medium (col 11 lines 43 – 64). Yamazaki does not explicitly teach wherein the base constituent is in an amount between 5 to 48 % by weight of total amount of said etching medium. Prior art Skorupski teaches NaOH etching mediums possessing between 8 and 16 %wt NaOH by weight of etching medium can suitably and predictably etch silicon substrates ([0020-022]). Because both Skorupski and Yamazaki in view of Ichinose teach method of etching silicon with NaOH-based etchants, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute one concentration for the other to achieve the predictable result of etching a silicon substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a NaOH % of 8 to 16 wt% by weight of etching medium, as taught by Skorupski, as the amount of NaOH in the method of Yamazaki in view of Ichinose as Skorupski teaches the suitability and predictability of etching silicon surfaces within this taught concentration range, and generally differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical (MPEP 2144.05II A).

Yamazaki in view of Ichinose and Skorupski have taught (above) wherein alkaline-hydroxide etchant is diluted in a water solvent, but none of these references explicitly teach wherein the etching medium further comprises at least one other

Art Unit: 1712

solvent. Klein teaches a chemical etching process comprising a thickened etching medium designed to etch silicon containing surfaces (abstract, pg 2). Klein further teaches that it is well known in the etching art that water and mixtures of water with other organic solvents can predictably serve as solvents for such thickened etching media (pg 3). As both Klein and the method of Yamazaki in view of Ichinose and Skorupski have taught thickened etching compositions for predictably etching silicon containing surfaces comprising an aqueous solvent it would have been obvious to one of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for one or the well known solvents taught by Klein, such as 1,2-Propandiol, to achieve the predicable result of etching a silicon containing surface.

Claim 16: Yamazaki teaches a method for etching of silicon surfaces and layers of solar cells for improving the antireflection behavior comprising applying an etching medium to the surface of said silicon or layer of a solar cell for improving the antireflection behavior (the textured surface (106) is formed by etching, whereupon a reflection preventing film (109) is formed (col 6 lines 56-60, col 12 lines 29-39)) where the resulting etched surface structure will influence the effectiveness of the antireflective film. Yamazaki further teaches forming a textured substrate surface, which is selectively exposed to the etchant to produce said structure (see, for example, col 11 lines 44-64). Yamazaki further teaches wherein the desired surface texture formed on the silicon substrate possess surface features on the order of 0.1 to 5 microns. Yamazaki has taught wherein the etching / texturing is intentional to control light scattering. Although Yamazaki has not explicitly taught wherein the etching is conducted to a depth of 1-3

Art Unit: 1712

microns, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated such a range of etching depth since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976) and further since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Yamazaki in view of Ichinose teaches the etching medium is a thickened alkaline liquid (as described in the rejection to claim 14 above). Yamazaki in view of Ichinose and Skorupski teaches the etching medium possesses a base (NaOH) concentration of from 8 to 16% by weight, based on total amount of said etching medium (as described in the rejection to claim 14 above).

Yamazaki in view of Ichinose and Skorupski have taught (above) wherein alkaline-hydroxide etchant is diluted in a water solvent, but none of these references explicitly teach wherein the etching medium further comprises at least one other solvent. Klein teaches a chemical etching process comprising a thickened etching medium designed to etch silicon containing surfaces (abstract, pg 2). Klein further teaches that it is well known in the etching art that water and mixtures of water with other organic solvents can predictably serve as solvents for such thickened etching media (pg 3). As both Klein and the method of Yamazaki in view of Ichinose and Skorupski have taught thickened etching compositions for predictably etching silicon containing surfaces comprising an aqueous solvent it would have been obvious to one

Art Unit: 1712

of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for one or the well known solvents taught by Klein, such as 1,2-Propandiol, to achieve the predicable result of etching a silicon containing surface.

Claims 2, 4, 6-8, 10-12, 19-24, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skorupski in view of Klein.

Claims 2, 8, and 10: Skorupski teaches the method of manufacturing circuit boards comprising etching silicon substrates and substrates with compositions containing silicon by applying an etchant on the surface of the substrates ([0007-0020]). Skorupski further teaches the selective etching of such substrate (see, for example, [0021]). Wherein the etching of silicon surfaces and layers is performed by an alkaline liquid (aqueous alkaline solution) typically in a concentration range of between about 5% to 25% by weight of the etchant medium ([0021-0022]). Skorupski teaches that duration of the etching step is determined by the chemical composition of the substrate, and is generally from about 10 sec to 4 min (see, for example, [0026]). Skorupski does not explicitly teach an exposure time of from 30 sec to 5 min, but it would have been obvious to one of ordinary skill in the art at the time of invention to have selected an exposure time of from 30 sec to 5 min since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).



Art Unit: 1712

Skorupski further teaches the etchant is activated by the input of energy (see, for example, exposure to thermal energy / heat, as etching by heating the etchant to temperatures between 40 to 65°C, [0026]).

Skorupski further teaches wherein the specific / selective areas to be etched are typically etched to remove at least 0.45 microns from the substrate (see, for example, [0024-0025]). Although Skorupski does not explicitly teach etching at depth within the range of 1-3 microns, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated an etch depth with the range since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)

Skorupski does not teach that the alkaline solution is thickened. Klein teaches a chemical etching process designed to etch silicon oxide surfaces wherein the etchant is mixed with an additive to form a paste (abstract, pg 2). Klein additionally teaches that the motivation to thicken the etching medium is that it allows a printable, homogeneous etching paste which is significantly less expensive than conventional wet and dry etching methods in the liquid and gas phases (pg 2), additionally use of a thickened paste allows for a high degree of automation and surface design (further support for selectively etching) (pg 2, 5). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have thickened, as taught by Klein, the etching medium taught by Skorupski to enable a printable etching process which is

Art Unit: 1712

significantly less expensive, and possesses a high degree of automation and surface design.

Skorupski in view of Klein teaches the process of claim 8 (above) wherein Skorupski has taught the etching medium comprises at least one solvent (water, as the etchant is an aqueous alkaline solution) [0022]. And Klein teaches the addition of a thickener to make the etching solution a paste (pg 4). Additionally Klein teaches that a variety of additives can have a positive effect on the printability of the printing paste (pg 4). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated additives as taught by Klein, in to the method of Skorupski in view of Klein as the taught additive can improve the printability of the etching paste. Further the examiner asserts that in claim 2 said additive is presented as optional, so this further limitation of a specific additive is not relevant to the rejection as presented wherein the actually required limitations of claim 2 have been met.

Skorupski further teaches wherein the solvent is water (as the etchant is an aqueous alkaline solution) [0022]. Skorupski teaches preferably the weight % of etchant material is about 10% to about 20% ([0022]). Klein teaches preferably the weight % of thickener is about 3 to 20% (pg 4), and additive is about 0 to 5% (pg 4). The combination of these components would leave between 55 and 87% of solvent by weight of the total amount of the etching medium. Klein teaches a chemical etching process comprising a thickened etching medium designed to etch silicon containing surfaces (abstract, pg 2). Klein further teaches that it is well known in the etching art that water and mixtures of water with other organic solvents can predictably serve as

Art Unit: 1712

solvents for such thickened etching media. As both Klein and the method of Skorupski in view of Klein have taught thickened etching compositions for predictably etching silicon containing surfaces comprising an aqueous solvent it would have been obvious to one of ordinary skill in the art at the time of invention to have substituted a portion of the water solvent for one or the well known solvents taught by Klein, such as 1,2-Propandiol, to achieve the predicable result of etching a silicon containing surface.

Claim 4: Skorupski in view of Klein teach the process of claim 8 (above), wherein Skorupski further teaches wherein the etching component is, for example, NaOH and KOH ([0022]).

Claim 6: Skorupski in view of Klein teach the process of claim 2 (above), wherein Klein further teaches preferably the weight % of thickener is about 3 to 20% by weight of the total etching medium (pg 4) and that the thickener is, for example, hydroxyethylcellulose (pg 4).

Claim 7: Skorupski in view of Klein teach the process of claim 2 (above), wherein Klein further teaches wherein the additive is, for example, a thixotropic agent (pg 4).

Claim 11: Klein further teaches the thickened etching paste is suitable for printing processes such as screen printing, stamping, and ink-jet printing (pg 5)

Claim 12: Skorupski further teaches rinsing off the etchant with deionized water ([0026]).

Claim 19: Skorupski in view of Klein teach the process of claim 5 (above), wherein Skorupski in view of Klein taught that between 55 and 87% of solvent (water) by weight of the total amount of the etching medium (in the rejection to claim 5 above).

Art Unit: 1712

Although these prior arts did not explicitly teach said solvent is from 15 to 85% by weight based on the total amount of the medium, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a concentration of solvent within the claimed range since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 20: Skorupski in view of Klein teach the process of claim 8 (above), within claim 8 from which claim 20 depends, carboxylic acid ester is presented as one of a group of solvents used together or separately with water, therefore if a carboxylic acid ester was not chosen as the additional solvent, the further limitation on carboxylic acid ester is not relevant to the rejection as presented. Further Klein who teaches that using a mixed solvent system is well known in the art has further explicitly taught [2,2-butoxy(ethoxy)]ethyl acetate or propylene carbonate (pg 3).

Claim 21: Skorupski in view of Klein teach the process of claim 2 (above), wherein in claim 2 said additive is presented as optional, so this further limitation of a specific additive is not relevant to the rejection as presented wherein the required limitations have already been met in the rejection of claim 2 (described above).

Claims 22 and 24: Skorupski in view of Klein teach the process of claim 8 (above), wherein Skorupski teaches preferably the weight % of alkaline etchant material is about 10% to about 20% by weight of the total amount of etching medium ([0022]).

Claim 23: Skorupski in view of Klein teach the process of claim 6 (above), wherein Klein further teaches preferably the weight % of thickener is about 3 to 20% by

Art Unit: 1712

weight of the total etching medium (pg 4), but does not explicitly teach the thickener is from 1 to 10% by weight, based on the total amount of the etching medium. It would have been obvious to one of ordinary skill in the art at the time of invention to have selected the concentration of thickener is from 1 to 10% by weight, based on the total amount of the etching medium since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 26: Skorupski in view of Klein teach the process of claim 8 (above), wherein Klein further teaches preferably the weight % of thickener is about 0.5 to 25% and preferably 3 to 20% by weight of the total etching medium (pg 4).

Claim 27: Skorupski in view of Klein teach the process of claim 24 (above), wherein Skorupski further teaches wherein the solvent is water (as the etchant is an aqueous alkaline solution) [0022]. Skorupski teaches preferably the weight % of etchant material is about 10% - to about 20% ([0022]). Klein teaches preferably the weight % of thickener is about 3 to 20% (pg 4), and additive is about 0 to 5% (pg 4) to form a printable etchant paste (abstract, pg 5). The combination of these components would leave between 55 and 87% of water by weight of the total amount of the etching medium. Although these prior arts did not explicitly teach said solvent is from 15 to 85% by weight based on the total amount of the medium, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected a concentration of solvent within the claimed range since in the case where the claimed ranges “overlap or

Art Unit: 1712

lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 28: Skorupski in view of Klein teach the process of claim 10 (above), wherein Skorupski in view of Klein teach an etching medium that can be activated by the input of heat. Skorupski are silent as to the source of the heat, so they do not explicitly teach a source as an IR lamp or a hotplate. Klein teaches a method of using an energy / heat activated etchant wherein the input of energy is supplied in the form of radiant heat via an IR lamp, capable of heating to 300°C (pg 2). It would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated the IR lamp as the heat source, as taught by Klein into the method of Skorupski in view of Klein as the primary reference, Skorupski, is silent, and when a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference, additionally Klein teaches a predictable means to apply heat in upwards of 300°C to an etchant paste deposited on a substrate.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Skorupski in view of Klein as applied to claim 8 above, and further in view of Ohlsen.

Claim 25: Skorupski in view of Klein teach the process of claim 8 (above), wherein Skorupski further teaches wherein the base constituent (see, for example KOH) is in an amount between 5 and 25%, and more precisely 8 to 12% by weight of the etching paste medium ([0022]). Skorupski does not explicitly teach wherein the base

Art Unit: 1712

constituent is in an amount between 30-40% by weight of said etching medium. Prior art Ohlsen teaches KOH etching mediums possessing 30%wt KOH by weight of etching medium can predictably etch silicon substrates at a rate of 1.65-1.75 micron / min (col 23 lines 20 - 25). Because both Ohlsen and Skorupski in view of Klein teach method of etching silicon with KOH-based etchants, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute one concentration for the other to achieve the predictable result of etching a silicon substrate. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a KOH % of 30 wt% by weight of etching medium, as taught by Ohlsen, as the amount of KOH in the method of Skorupski in view of Klein as Ohlsen teaches a predictable method of etching silicon at a rate of 1.65-1.75 micron / min, and generally differences in concentration will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical (MPEP2144.05II A).

### ***Response to Arguments***

Applicant's arguments filed 5/4/10 have been fully considered but they are not persuasive.

The applicant directs the examiner's attention again to the declaration under 37 CFR 1.132 filed 10/2/09 (pg 3-6 of remarks). Here again, the examiner asserts that the declaration under 37 CFR 1.132 filed 10/2/09 is insufficient to overcome the rejection of

Art Unit: 1712

claims 2, 4, 6-8, 10-12, 14, 16, and 19-28 based upon the cited prior art as set forth in the last Office action because:

The presented scientific evidence has only selected one specific iteration with regard to etching conditions (etching chemistry species, concentration, etching temperature, etching time, etc.) while the claimed subject matter covers a significantly larger scope without such limitation (as claimed, any organic / inorganic base, over 4-48% by weight, at any temperature, time from 30s to 5 min, and a wide variety of solvents). Thus there is no showing that the objective evidence of unexpected results is commensurate in scope with the claims. Further the prior art have all provided a variety of ranges with respect to the etching conditions (etching chemistry species, concentration, etching temperature, etching time, silicon orientation, etc.), the examiner is unconvinced by the evidence at one singular data point to refute the entirety of the teachings of the prior art references. One of ordinary skill in the art would appreciate that alterations in the above etching conditions would influence the rate of etching per specific materials, and as such, one data point is not sufficient to outweigh the evidence of obviousness. Further as discussed in the rejections above, etching depths described by primary references Yamazaki and Skorupski both have taught etching depth ranges overlapping the claimed 1-3 microns, and further have taught that it is well known in the art to vary the etching species / concentration relative to the chemical composition of the substrate to be etched. Additionally, no singular prior art reference is used to reject any singular claim, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re*



Art Unit: 1712

*Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., compositions of the present application have to be free of particles (pg 3 of declaration), and that the claimed composition is used in a process further requiring "subsequent deposition of metallic circuits into the etched lines" (pg 3 of arguments), "the compositions of Skorupski do not result in enhanced silicon edge isolation") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In view of the forgoing, when all of the evidence is considered, the totality of the applicant's arguments towards nonobviousness fails to outweigh the evidence of obviousness.

In response to applicant's arguments that the prior art do not teach selective etching, or etching to depths of 1-3 microns (pg 2-7), the examiner directs the applicant's attention to the rejections above.

In response to applicant's arguments against the references individually (Yamazaki, Ichinose, Skorupski, Klein, Ohlsen, pgs 2-7 of remarks), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning (pg 6-7), it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). The examiner asserts the motivation for combination of the prior art as presented is further explained in response to specific arguments below and in the appropriate rejections above.

The examiner asserts that the arguments of counsel cannot take the place of evidence in the record. *In re Schulze*, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965).

In response to applicant's argument that Yamazaki / Ichinose is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). Prior art that is in a field of endeavor other than that of the applicant or solves a problem which is different from which the applicant was trying to solve, may also be considered for the purposes of 35 U.S.C. 103 "[t]he first error... in this case was... holding that courts and patent examiners should look only to the problem the patentee

Art Unit: 1712

was trying to solve. The Court of Appeals failed to recognize that the problem motivating the patentee may be only one of many addressed by the patent's subject matter... The second error [was]... that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem.” *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. \_\_\_, 82 USPQ2d 1385 (2007). In this case, both Yamazaki and Ichinose are both (as is the applicant's invention) in the field of alkali etchants and method of applying alkali etchants. In response to applicant's argument that there is no teaching, suggestion, or motivation to combine the references, the examiner recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In this case, the motivation to thicken the etching medium taught by Yamazaki is provided by Ichinose which teaches that etching with a paste “has excellent selectivity, and does little to no damage to the non-etching region” (col 1 lines 8-16), additionally, Ichinose teaches that applying the etchant as a paste is advantageous over conventional methods in that no pre-processes for forming a positive resist pattern, exposure, and development are required to apply an etched pattern to a surface; in addition, the post-process of resist removal is not needed (col 4 lines 7-30). Therefore it would have been obvious to one of ordinary skill

Art Unit: 1712

in the art at the time of invention to have thickened, as taught by Ichinose, the etching medium taught by Yamazaki to enable spatial etch selectivity that would eliminate processing steps.

In response to applicant's argument that Skorupski "does not etch silicon surfaces" (pg 4 of remarks). The examiner directs the applicant to [0020] (for example) of Skorupski wherein silicon and silicon containing compositions are taught as suitable and conventional substrates to be etched.

In response to applicant's argument that "none of cited references teach or suggest a printable thickened etching paste having from 10-90% by weight of a solvent which is a mixture of water and at least one other solvent" (pg 2 and throughout pgs 2-7 of remarks). The examiner directs the applicant to the teaching in Klein (such as pg 3) that it is well known in the etching art that water and mixtures of water with other organic solvents can predictably serve as solvents for such thickened etching media, and has similarly taught the solvent at a portion of 10-90 wt% (pg 3). In response to applicant's argument that Klein is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). Prior art that is in a field of endeavor other than that of the applicant or solves a problem which is different from which the applicant was trying to solve, may also be considered for the purposes of 35 U.S.C. 103 "[t]he first error... in this case was... holding that courts and patent examiners should look only to

Art Unit: 1712

the problem the patentee was trying to solve. The Court of Appeals failed to recognize that the problem motivating the patentee may be only one of many addressed by the patent's subject matter... The second error [was]... that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem." *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. \_\_\_, 82 USPQ2d 1385 (2007). In this case, both the method of Skorupski and Klein are both (as is the applicant's invention) in the field of etching silicon containing surfaces and methods of applying such etchants. Additionally, Klein is in the field of applicant's endeavor, namely a novel etching media in the form of etching pastes and use of such media. Further Klein has explicitly provided the motivation for combination that it allows a printable, homogeneous etching paste which is significantly less expensive than conventional wet and dry etching methods in the liquid and gas phases (pg 2), additionally use of a thickened paste allows for a high degree of automation and surface design (pg 2, 5). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have thickened, as taught by Klein, the etching medium taught by Skorupski to enable a printable etching process which is significantly less expensive, and possesses a high degree of automation and surface design.

In response to applicant's arguments that "However, there is nothing which would lead a skilled worker to choose from among the 36 specific solvents listed or any of the hundreds of possible solvents from among the classes of solvents to arrive at a mixture of water with another solvent" (pg 5 of remarks); the examiner asserts that the primary reference has already taught the water component, and Klein has taught that it is well

Art Unit: 1712

known in the etching art to provide aqueous mixtures of solvents to predictably perform solvent functions for thickened etching media, and further additionally serve to suitably remove the corrosive media and clean the surface. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated an additional solvent species with water to achieve the predictable result of serving as solvent for a thickened etchant. Further in regard to size of the suitable solvents group taught by Klein, the examiner asserts that significant overlap of the taught solvents and the claimed solvents exist between Klein and the claimed invention. Further when the species is clearly named, the species claim is anticipated (rendered obvious) no matter how many other species are additionally named. *Ex parte A* 17 USPQ2d 1716 (Bd. Pat. App. & Inter. 1990).

As to the dependent claims, they remain rejected as no separate arguments are provided.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 1712

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHAN H. EMPIE whose telephone number is (571)270-1886. The examiner can normally be reached on M-F, 6:45- 4:15 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. H. E./  
Examiner, Art Unit 1712

/Michael Cleveland/  
Supervisory Patent Examiner, Art Unit 1712